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Professor Stephen M Kosslyn		Professor Stephen Kosslyn Department of Psychology Harvard University Cambridge, MA 02138
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The equipment purchased under this grant consisted of three VAXstations and two Macintosh II systems. The equipment was used by three major investigators and a large number of their graduate students for such purposes as speech analysis and synthesis and stimulus construction, connectionist modeling of visual systems, experimentation and perception, attention and memory, and the effects of representational format on transfer effects in learning. Nearly 20 publications resulted or are in press in addition to several presentations at national and international scientific meetings. SMC		
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HARVARD UNIVERSITY  
DEPARTMENT OF PSYCHOLOGY

26 February 1990

WILLIAM JAMES HALL  
33 KIRKLAND STREET  
CAMBRIDGE, MASSACHUSETTS 02138

Dr. Al Fregly  
Life Sciences Directorate  
Air Force Office of Scientific Research (AFSC)  
Department of the Air Force  
Bolling Air Force Base, DC 20332-6448

Dear Al:

I am writing to provide a final report on our DURIP equipment grant #88450-0053, "Computational modeling of cognitive processes," which included Drs. Peter C. Gordon and Jay G. Rueckl and Co-PIs.

What was purchased

One VAXstation 3500, with a 4-plane monochrome monitor, A/D and D/A converters (for Gordon);

Two VAXstation 3200, 4-plane monochrome, RD54 disk computers (one each for Kosslyn and Rueckl);

Two Macintosh II with 40 Mb hard disk and color monitor computers (one each for Kosslyn and Rueckl).

What the equipment is being used for

Gordon. The equipment is being used for speech analysis, speech synthesis, and stimulus construction.

Kosslyn. Both machines are being used for two purposes: First, they are being used to simulate a "modular" model of high-level vision, which can be given "lesions." The results of these experiments in turn make predictions about the possible consequences of brain damage, and these predictions are being tested. Second, they are used to implement a series of connectionist models of visual processes, most recently those involving neurons in area 7a of the parietal lobe.

Rueckl. The VAXstation is being used in a number of connectionist simulation projects. These include studies of: 1) The effects of the properties of mapping functions on the behavior of connectionist systems; 2) The effects of representational format on transfer effects in learning; 3) A connectionist model of visual word identification; 4) A connectionist model that offers an alternative account for Rumelhart & McClelland's interactive activation model's account of similarity effects in repetition priming.

The Macintosh II is being used in all aspects of experimentation on perception, attention, and memory. These projects include: 1) Studies of word and pseudoword identification; 2) Studies of implicit and explicit memory for new associations; 3) Studies of attentional mechanisms in the processing of letter strings.

Students involved in the research

Gordon. Graduate students: David Gow, Jennifer Eberhardt (minority). Undergraduate students: Christopher Schaeffer, Shelia Kennison.

Kosslyn. Graduate students: Carolyn Cave, Lynn Hillger, Kris Kirby, Vera Maljovic, Chad Marsolek, Daniel Willingham, Michael Van Kleeck. Undergraduate students: Daren Codd, Eliot Hazeltine, Nancy Kim, Rob McPeek, Randall O'Reilly.

Rueckl. Graduate students: Itiel Dror, Kris Kirby, Chad Marsolek, Suling Yeh. Undergraduate students: Eric Bing, Hung Chen, Jon Kolodny, Liddy Olds, Rob McPeek, Satoru Suzuki.

Publications and manuscripts in preparation

Gordon:

Eberhardt, J. L., & Gordon, P. C. (1989). The effects of attention on the phonetic intergration of acoustic information. Journal of the Acoustical Society of America, 86, Suppl. 1.

Gow, D. W., & Gordon, P. C. (1989). Two paradigms for examining the role of phonological stress in sentence processing. Journal of the Acoustical Society of America, 86, Suppl. 1.

Gordon, P. C., Schaeffer, C. P., & Kennison, S. M. (in preparation). Disambiguation of segmental dependencies by extended phonetic context.

Gordon, P. C., Eberhardt, J. L., & Rueckl, J. G. (in preparation). The role of attention in determining the phonetic significance of acoustic cues.

Gow, D. W., & Gordon, P. C. (in preparation). Syllable stress in the processing and representation of spoken sentences.

Kosslyn:

Kosslyn, S. M. (in press). Computational theories of imagery. Dictionary of Cognitive Science. London: Basil Blackwell.

Kosslyn, S. M., and Van Kleeck, M. (in press). Broken brains and normal minds: Why humpty-dumpty needs a skeleton. In E. Schwartz (Ed.), Computational Neuroscience. Cambridge, MA: MIT Press.

Kosslyn, S. M., Flynn, R. A., and Amsterdam, J. B. (in press). Components of high-level vision: A cognitive neuroscience analysis and accounts of neurological syndromes. Cognition

Kosslyn, S. M., Van Kleeck, M. C., and Kirby, K. N. (in press). A neurologically plausible theory of individual differences in visual mental imagery. In J. T. E. Richardson, P. Hampson, and D. Marks (Eds.), Advances in Mental Imagery. London: Routledge.

Kosslyn, S. M., Koenig, O., Barrett, A., Cave, C. B., Tang, J., and Gabrieli, J. D. E. (in press). Evidence for two types of spatial representations: hemispheric specialization for categorical and coordinate relations. Journal of Experimental Psychology: Human Perception and Performance

Van Kleeck, M. H., and Kosslyn, S. M. (in press). The use of computer models in the study of cerebral lateralization. In F. L. Kitterle

(Ed.), Cerebral Laterality: Theory and Research. Hillsdale, NJ: Erlbaum  
Kosslyn, S. M., and Chabris, C. F. (in press). Naming pictures.  
Journal of Visual Languages and Computing,  
O'Reilly, R. C., Kosslyn, S. M., Marsolek, C. J., and Chabris, C. F. (in press). Receptive field characteristics that allow parietal lobe neurons to encode spatial properties of visual input: A computational analysis. Journal of Cognitive Neuroscience, 2,  
Kosslyn, S. M. (in preparation). Networks of High-Level Vision: A Cognitive Neuroscience Analysis. Cambridge, MA: MIT Press.

Rueckl:

Rueckl, J. G. (in press). Similarity effects in word and pseudoword repetition priming. Journal of Experimental Psychology: Learning, Memory, and Cognition.  
Rueckl, J. G. (in revision). Letter-level effects in repetition priming.  
Rueckl, J. G., Kolodny, J., & McPeek, R. M. (in preparation). Systematicity and structure in associative mapping functions.  
Rueckl, J. G., & Marsolek, C. (in preparation). Depth of processing and implicit memory for new associations.  
Rueckl, J. G., & Yeh, S. L. (in preparation). Early and late selection in the processing of letter strings.  
Rueckl, J. G. (1989). Repetition priming as perceptual learning. Presented at the International Conference of Event Perception, Oxford, OH.  
Rueckl, J. G. (1989). Similarity and systematicity in repetition priming. Presented at the Meeting of the Psychonomic Society, Atlanta, GA.

In short, we are making good use of the equipment, and are very grateful for your providing us with the means to acquire it.

Thank you again.

Sincerely,



Stephen M. Kosslyn  
Professor

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